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ABSTRACT

In the late 1970s, the Department of Defense requested that the reference population for the Armed Services Vocational Aptitude Battery (ASVAB) be changed and updated to reflect the current youth population. Analyses of new data collected in 1980 indicated that speeded subtest scores of the new sample were atypically low and that the sample might therefore be inappropriate for use as a reference. A preliminary investigation traced the problem to a nonoperational answer sheet used for data collection of the 1980 youth sample. The present project was designed as a large-scale test of the differences between these nonoperational answer sheets and the operational answer sheets. Data were collected on the two speeded subtests from about 9,500 service applicants at Military Entrance Processing Stations; half used operational and half used nonoperational answer sheets that were employed in the youth sample. Scores from nonoperational answer sheets were then equated to scores from the operational answer sheets. Adjustments based on equatings between the operational and nonoperational answer sheets were found to resolve the observed anomalies in the 1980 sample. Results indicated that the 1980 sample of American youth could be used appropriately with these adjustments. (Author/LMO)

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ARMED SERVICES VOCATIONAL APTITUDE BATTERY: CORRECTING THE SPEEDED SUBTESTS FOR THE 1980 YOUTH POPULATION

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This report has been reviewed and is approved for publication.

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In the effort to change the reference base of the Armed Services Vocational Aptitude Battery to a sample representative of American youth in 1980, anomalies noted in the speeded subtest performance of the new sample indicated it might be an inappropriate reference. Discrepancies were traced to a nonoperational answer sheet used for data collection of the 1980 youth sample. An experimental study was conducted to correct the problem by equating scores on nonoperational answer sheets to scores on operational answer sheets. Data were collected on the speeded subtests from about 9,500 service applicants at Military Entrance Processing Stations; half used operational answer sheets and half used the nonoperational answer sheets that were employed in the youth sample. The results indicated that the adjustments for the answer sheets resolved the anomalies and that the 1980 sample of American youth could be appropriately used with these adjustments.

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SUMMARY

In the late 1970s, the Department of Defense requested that the reference population for the Armed Services Vocational Aptitude Battery (ASVAB), which at that time was based on a 1944 sample, be changed and updated to reflect the current youth population. An investigation was conducted in 1980 to collect the data for the new reference group. Analyses of the data indicated that speeded subtest scores of the new sample were atypically low and that the sample might therefore be inappropriate for use as a reference.

A preliminary investigation at the Air Force Human Resources Laboratory traced the problem to a nonoperational answer sheet used for data collection of the 1980 youth sample. The present project was designed as a large-scale test of the differences between these nonoperational answer sheets and the operational answer sheets, in an effort to find an adjustment to resolve the differences. Data were collected on the two ASVAB speeded subtests from about 9,500 service applicants at Military Entrance Processing Stations. Half of the applicants used operational answer sheets; half used the same type of nonoperational answer sheets that were employed in the 1980 youth sample. The speeded subtest scores from the nonoperational answer sheets were then equated to the speeded subtest scores from the operational answer sheets. Adjustments based on these equatings were found to resolve the observed speeded subtest anomalies in the 1980 youth sample. It was recommended that the adjustments developed in this project be made to the speeded subtest data for the 1980 youth sample and that ASVAB Forms 11, 12, and 13 be implemented in this new score metric.

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PREFACE

This effort was completed at the request of the Office of the Assistant Secretary of Defense. It was accomplished under Project 7719, "Development and Validation of Selection Methodologies" and was executed as part of a continuing responsibility to provide technical information to aid policy decisions.

This effort could not have been accomplished without the cooperation and dedication of several individuals at the Air Force Human Resources Laboratory. Col J. P. Amor and Drs. Nancy Guinn and William Alley of the Manpower and Personnel Division provided helpful guidance during the design and editing phases of this effort. Their contributions enhanced this report. Special gratitude is expressed to Technical Services Division personnel who devoted long hours and put aside other projects to provide rapid computer programming and processing. Exceptional efforts were put forth by Ms. Doris Black, Mr. James Brazel, Sgt Drake Hodge, and Mr. William Glasscock. The accomplishment of this effort was greatly enhanced by the contributions of these people.

Finally, a special thanks is offered to Drs. William Sims and Milton Maier of the Center for Naval Analyses. Without their cooperation and assistance, it would have been difficult to conduct this effort.

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ARMED SERVICES VOCATIONAL APTITUDE BATTERY: CORRECTING THE SPEEDED SUBTESTS FOR THE 1980 YOUTH POPULATION

I. INTRODUCTION

This study describes the development of adjustments to data obtained from the 1980 reference population for the Armed Services Vocational Aptitude Battery (ASVAB). The ASVAB is the primary selection and classification device for enlisted entry to all of the armed services. It is a multiple aptitude battery comprised of eight power subtests and two speeded subtests. The reference population for this test, as well as for most previous aptitude tests for military enlistment, was established on a World War II sample of approximately 800,000 males who were in the services in 1944.

The Department of Defense decided in the late seventies that the reference population for the ASVAB should be updated to be representative of the current youth population. In 1980 the National Opinion Research Center (NORC) collected a sample of American youth for use as a normative base for the ASVAB (McWilliams, 1980). To accomplish this, ASVAB Form 8ax was administered to a sample of about 12,000 youth between the ages of 16 and 23. They constituted a stratified probability sample that was statistically weighted to be representative of American youth. A subsample consisting of the 18 through 23 year old males and females was identified for use as the 1980 reference population for the ASVAB (Maier & Sims, 1982). Original plans were to implement this 1980 score scale as the normative reference for the ASVAB in October 1983.

In preparation for the implementation of the 1980 scale metric, work was done to translate the ASVAB subtests and composites into the new score scale (Maier & Sims, 1982; Ree, Valentine, & Earles, 1985). An additional investigation by Sims and Maier (1983) at the Center for Naval Analyses explored the appropriateness of this new scale metric for military use. As part of their analyses, they compared the results obtained from the males in the 18 through 23 year old segment of the American youth sample to the results obtained from several samples of male military applicants and recruits, making comparisons at different aptitude levels. Comparisons were made using only males because the 1944 normative base for the ASVAB was based on males only. (See Table 1 for identification of the subtests in ASVAB). Comparisons on the ten subtests revealed that the sample of American male youths and the samples of male military applicants and recruits did not differ significantly on any of the eight power subtests. Notable differences in subtest performance were found, however, on both the Numerical Operations (NO) and Coding Speed (CS) subtests (the two speeded subtests of the ASVAB). The differences were such that at each aptitude level, scores for those in the 1980 youth sample were consistently lower than scores for those tested in military testing environments. After controlling for general ability, this difference, in favor of military groups, was 3.01 raw score points on NO and 1.14 raw score points on CS.

Table 1. Subtests in ASVAB Forms 8 Through 10

Subtest	Number of Items
General Science (GS)	25
Arithmetic Reasoning (AR)	30
Word Knowledge (WK)	35
Paragraph Comprehension (PC)	15
Numerical Operations (NO)[a]	50
Coding Speed (CS)[a]	84
Auto and Shop Information (AS)	25
Mathematics Knowledge (MK)	25
Mechanical Comprehension (MC)	25
Electronics Information (EI)	20

[a]Speeded Subtests.

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Sims and Maier (1983) concluded from these results that if the 1980 reference population were used, the speeded subtest scores of persons tested under military conditions would be inflated. They projected that the amount of inflation would range from about four percentile points on the Armed Forces Qualification Test (AFQT), the major enlistment selection composite, to 13 percentile points on the Air Force Administrative Composite. Sims and Maier suggested that the deviations on the speeded subtests were the result of differences between the NORC and military testing environments. They recommended that implementation of the 1980 scale metric as the ASVAB reference population be delayed until the issue of differential performance on the speeded subtests could be resolved.

Following this report, Earles, Giuliano, Ree, and Valentine (1983) conducted an investigation of the speeded subtest effects. A preliminary review of the NORC and military testing procedures led to the evaluation of three plausible hypotheses for the difference between the NORC and military groups. The first hypothesis was that the differences found in subtest scores reflected a real difference in performance between civilian samples and military samples. The second hypothesis, developed after careful inspection of the testing materials used in the NORC study, was that the NORC answer sheets varied enough from operational ASVAB answer sheets (DoD Form 1304.12-C) to account for the difference in speeded subtest performance. A previous investigation by Valentine and Cowan (1974) had suggested that answer sheet format could have a significant impact on performance. Finally, administrative differences in the NORC versus military testing environments (e.g., time of day tested, subject motivation) were hypothesized to be potential sources of differential subtest performance.

Investigation of these three hypotheses revealed that variations in answer sheets could account for almost all of the differences in speeded subtest performance observed by Sims and Maier (1983). Earles et al. (1983) based this conclusion on a research study conducted with 512 male Air Force basic trainees. Using random assignment, half of the examinees were administered ASVAB Form 8a on operational answer sheets as per standard military testing procedures, and half were administered ASVAB Form 8ax on NORC answer sheets as was done in the 1980 youth study. Forms 8a and 8ax are identical in content but differ in layout (for example, the number of items per column differs). For the experimental session, Forms 8a and 8ax were used to replicate prior testing conditions. The answer sheets differed in several ways, the most obvious being the size and shape of the response indicators. On the NORC answer sheets, responses were made in circles 2.38mm in diameter. Included on the answer sheet was an example of a correct response. It specified that the circles should be completely filled in, which is time-consuming. On the operational answer sheets, responses were made in brackets about 1mm wide and 4mm high. The area within these brackets can be filled-in rapidly. Another notable distinction between the two answer sheets involved the layout of response grids. The layout of response grids on the operational answer sheets corresponded exactly with the layout of the items in the ASVAB 8a test booklets. For example, for an item at the top of the second column, the response grid was at the top of the second column on the answer sheet. The layout of the items in the ASVAB 8ax test booklets had no correspondence with the layout of response grids on the NORC answer sheets.

The results of this pilot study showed a difference between the two answer sheet groups of about 3.61 raw score points for NO and 1.48 raw score points for CS, with higher scores obtained by those using the operational answer sheets. Other indices revealed that the groups were equivalent in aptitude. Equipercentile equatings between the operational answer sheet group and the NORC answer sheet group were performed for NO and CS. Adjustments were developed from these equatings to correct the scores obtained when the NORC answer sheets were used. These adjustments were then applied to the subsample (18 through 23 year old males) in the NORC study for whom the original discrepancy had been noted by Sims and Maier (1983). Through a series of linear models analyses (Ward & Jennings, 1979), it was determined that the adjustments from the

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equatings corrected the speeded subtest discrepancies between the NORC sample and military samples. Earles et al. (1983) concluded from this investigation that it would be possible to make adjustments to the speeded subtest scores in the 1980 youth sample to make it an appropriate reference population. Although the results of the Earles et al. (1983) study were encouraging, the sample on which the equatings were based was relatively small and restricted in that it consisted of male Air Force basic recruits who were not representative of lower aptitude levels. The present research was conducted to extend the Earles et al. (1983) study using a large sample that was representative of applicants to all the armed services. It was believed that the equatings based on this sample would confirm the results of the pilot study and provide stable adjustments to the 1980 reference population.

II. METHOD

Sample

Approximately 9,490 applicants for military service (15% females, 85% males) participated in this study prior to taking the production ASVAB. All military applicants who were testing for enlistment were included except subjects testing for verification of previous scores. Testing was conducted during October and November 1983 at 19 Military Entrance Processing Stations (MEPS) geographically dispersed to ensure a full ability range sample of military applicants. An average of 20 applicants was tested in each session, as is the usual practice for enlistment qualification testing.

Test Administration

Prior to the beginning of the study, test administrators were provided with special administrative instructions (see Appendix A). These described the purpose of the study, and provided instructions to be read verbatim. Standard operating procedures were followed at each MEPS in preparing applicants for testing. The test administrator explained that applicants would be taking two sets of tests over a period of about 3 1/2 hours. Applicants took the special test, consisting of the NO and CS subtests, followed by the regular production ASVAB.

For the special test, half of the examinees received operational ASVAB answer sheets (DoD 1304.12-C) and half received NORC-style answer sheets as were used in the American youth population study. Prior to testing, the third page was removed from the operational answer sheets used for the special test, and all remaining subtest areas except 5 (NO) and 6 (CS) were crossed out. On the NORC-style answer sheets, a shaded area with the phrase "THIS PART OF THE TEST IS NOT USED" replaced all parts except 5 (NO) and 6 (CS). Examinees were randomly assigned to the two answer sheet groups. Samples of the two answer sheets are provided in Appendix B.

A test booklet containing the NO and CS subtests from ASVAB Form 8a was given to each examinee with an operational ASVAB answer sheet. A test booklet containing the NO and CS subtests from ASVAB Form 8ax was given to each examinee with a NORC-style answer sheet. As in the pilot study, the respective test forms were used to replicate actual testing conditions.

The test administrator checked to make certain all examinees had test booklets correctly corresponding to their answer sheet types, and then explained to each group how to fill in the identifying information (i.e., name and social security account number). Following general instructions and the reading of a Privacy Act Statement, the NO subtest (3 min) and CS subtest (7

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min) were administered using standard ASVAB directions. Highly accurate hand-held digital electronic stop watches were provided to all MEPS for timing the special tests.

After subjects completed the special tests, the booklets and answer sheets were collected. Test administrators then proceeded to administer the production ASVAB in its entirety, following standard instructions. Applicants were randomly given one of the then currently operational ASVAB Forms 9a, 9b, 10a, 10b, 10x, or 10y. (10x and 10y are scrambled versions of 10a and 10b, respectively.) No break was allowed between the special and production testing.

III. RESULTS AND DISCUSSION

Data Editing

All raw test data from the special tests and production tests were sent to the Air Force Human Resources Laboratory, where the operational answer sheets used in the production tests and special tests were scanned. The NORC-style answer sheets used in the study were scanned by the contractor who had printed these answer sheets. It was the same contractor who had printed and scanned the answer sheets for the 1980 American youth population study.

Data were collected from about 9,490 applicants. After scanning and matching production answer sheets with the answer sheets from the special tests on the basis of social security account number, 8,906 complete cases were available. This number was reduced to 8,808 to randomly create an equal number of applicants in each answer sheet group.

Data editing was accomplished with procedures similar to those used by Ree, Mathews, Mullins, and Massey (1982). A key check was done to determine if applicants had coded the correct test form (9a through 10y) on the operational test. The easiest four items on each of the WK, NO, and CS subtests on the production ASVAB were scored and summed using the key for the test form indicated. Any applicant with a score of six or less was flagged, and the 12 items were scored with each of the other five keys. Changes were made when the score using a test form other than the one indicated was 8 points or more and was clearly higher than the score obtained with any other key. Applicants were deleted from the sample when scores were uniformly low due to suspected lack of effort or an anomaly in the testing situation.

Additional data editing was accomplished by inspecting a series of scatter plots and regression analyses for the following pairs of variables: NO (special test) with NO (production test); CS (special test) with CS (production test); CS (production test) with NO (production test); MK (production test) with AR (production test); NO (production test) with AR (production test). The first two regressions were designed to tap motivational differences between the special and production tests; the next two examined motivational differences between the first and last half of the production test; and the final regression was designed to reveal information about test compromise. Applicants with standardized residuals outside the range of ± 2.50 units were identified for further scrutiny. Suspect scores were individually located on the appropriate scatter plots, and applicants were deleted from the sample when it was clear their scores were away from the bulk of the scatter. An applicant with a raw score of 40 on the production NO and a raw score of 10 on the special NO, for example, was suspected of motivational differences and was not included in the sample. After the removal of suspect subjects (less than two percent), groups were made equal in size for a total of 4,299 applicants in each answer sheet condition. This sample was used for all subsequent analyses.

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Sample Comparisons

To ensure that the random assignment of applicants to answer sheet conditions had resulted in equivalent groups, the two groups were compared on several demographic variables and production test scores. Breakdowns of the demographic variables obtained on applicants are presented in Table 2. Distributions of education level, population group, and service for which applying were comparable for the two groups.

Table 2. Demographic Characteristics of the Sample

		Answer Sheet Group			
		NORC		Operational	
Characteristic	Level	Frequency	Percentage	Frequency	Percentage
Education	8 or less	7	0	4	0
	9	54	1	50	1
	10	155	4	133	3
	11	796	19	764	18
	12	409	10	382	9
	HS	1806	42	1841	43
	GED	267	6	289	7
	13 +	777	18	798	19
	Blank	28	1	38	1
Population Group	Amer Ind	27	1	41	1
	Span Amer	254	6	298	7
	Asian	55	1	62	1
	Black	1068	25	1003	23
	White	2830	66	2825	66
	Other	65	2	68	2
	Blank	0	0	2	0
Service	USAF	594	14	607	14
	Army	2181	51	2222	52
	USMC	603	14	633	15
	Navy	823	19	734	17
	Coast Guard	98	2	102	2
	Blank	0	0	1	0

Descriptive statistics were computed to compare the means of the eight power subtests on the production test. It was expected that power subtest scores would not be affected by the administration of the special tests and would allow accurate comparisons of the aptitude of the two groups. Table 3 shows the means of the two answer sheet groups on the power subtests. Lack of statistical significance between the means revealed the two groups were equivalent in aptitude.

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Table 3. Power Subtest Comparisons

Test	Answer Sheet Group: NORC Mean	NORC SD	Operational Mean	Operational SD	F Ratio
General Science	16.104	4.784	15.982	4.714	1.41
Arithmetic Reasoning	18.990	6.484	18.876	6.458	.66
Word Knowledge	26.199	6.532	25.969	6.457	2.69
Paragraph Comprehension	11.087	2.838	11.035	2.853	.72
Auto and Shop Information	16.519	5.082	16.407	5.126	1.03
Math Knowledge	13.813	5.444	13.636	5.424	2.26
Mechanical Comprehension	15.370	4.810	15.242	4.806	1.51
Electronics Information	12.558	3.567	12.491	3.592	.75

[a]Degrees of freedom are 1 and 8596. Type 1 error rate was set at $p < .01$ per hypothesis. No F ratios were significant at this level.

Special Speeded Subtests

Once the two groups were found to be equivalent, mean comparisons were made for NO and CS scores from the special test. These means are presented in Table 4. For both speeded subtests, the group tested with operational answer sheets performed significantly better than did the group tested with NORC-style answer sheets. The differences observed by Sims and Maier (1983) between military samples and the 1980 youth population were also found between samples of military applicants who used different answer sheets. This indicates that the previously observed effects were more likely the result of the answer sheets, rather than testing in a military environment.

Table 4. Speeded Subtest Comparisons

Test	Answer Sheet Group: NORC Mean	NORC SD	Operational Mean	Operational SD	F Ratio
Numerical Operations	32.639	8.748	35.829	8.889	281.17
Coding Speed	45.594	12.211	46.930	12.582	24.95

[a]Degrees of freedom are 1 and 8596. Type 1 error rate was set at $p < .01$ per hypothesis. Both F ratios were significant at this level.

Equatings

After identifying the speeded subtest differences between the two answer sheet groups, the score differences were reduced using adjustments from the equatings. For NO and CS, a series of linear and equipercentile equatings was done to equate scores on the NORC-style answer sheet to scores on the operational answer sheet. This would provide conversions to adjust for differences in scores resulting from the use of the nonoperational NORC-style answer sheets. Equipercentile equatings included unsmoothed and analytically smoothed (linear, quadratic, and cubic polynomial regression) variants. Constraints on equated results were imposed to insure increasing monotonicity and to restrict equated scores to the raw test score range. The first four moments of a distribution (mean, variance, skewness, and kurtosis) were computed for the two groups on the NO and CS data, and several deviation indices (bias, average absolute deviations, and root mean square deviation; see Ree, Mathews, Mullins, & Massey, 1982) were computed to compare the equatings.

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For NO, difference in the shapes of the score distributions produced by the two answer sheet groups suggested that linear equating was inappropriate. Deviation indices showed both the quadratic and cubic polynomial smoothings of the equipercentile equatings to be reasonable smoothing methods. The quadratic smoothing, however, involved fewer estimators than did cubic smoothing and resulted in more stable values. Thus, the method used for NO was a constrained equipercentile equating with quadratic polynomial smoothing. Comparisons of the two groups on CS revealed that the shapes of the score distributions were almost identical. Linear equating was therefore selected, and scores were constrained to keep them within the range of the test.

The specified equatings resulted in real number scores designed to make performance on NORC-style answer sheets comparable with performance on operational answer sheets. These scores were rounded to integers to make them appropriate for operational use. In the rounding procedure used, .5000 was added to scores, and scores were then truncated. Table 5 shows the raw score conversions for equating the NO and CS scores on NORC-style answer sheets to those on operational answer sheets.

Table 5. Conversion of NORC Scores to Operational Scores for NO and CS

NORC RAW SCORE	NO[a] (n=4,299)	CS[a] (n = 4,299)	NORC RAW SCORE	NO[a] (n = 4,299)	CS[a] (n = 4,299)
0	0	0	42	45	43
1	0	1	43	46	44
2	1	2	44	47	45
3	2	3	45	48	46
4	4	4	46	49	47
5	5	5	47	49	48
6	6	6	48	50	49
7	8	7	49	50	50
8	9	8	50	50	51
9	10	9	51		53
10	11	10	52		54
11	12	11	53		55
12	14	12	54		56
13	15	13	55		57
14	16	14	56		58
15	17	15	57		59
16	18	16	58		60
17	19	17	59		61
18	21	18	60		62
19	22	20	61		63
20	23	21	62		64
21	24	22	63		65
22	25	23	64		66
23	26	24	65		67
24	27	25	66		68
25	28	26	67		69
26	29	27	68		70
27	30	28	69		71
28	31	29	70		72
29	33	30	71		73
30	34	31	72		74
31	35	32	73		75
32	36	33	74		76

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Table 5. (Concluded)

NORC RAW SCORE	NO[a] (n=4,299)	CS[a] (n = 4,299)	NORC RAW SCORE	NO[a] (n = 4,299)	CS[a] (n = 4,299)
33	37	34	75		77
34	38	35	76		78
35	39	36	77		79
36	39	37	78		80
37	40	38	79		81
38	41	39	80		82
39	42	40	81		83
40	43	41	82		84
41	44	42	83		84
			84		84

[a]After adjustment from equating.

Adjusted Mean Comparisons

To examine the effectiveness of these equatings, NO and CS scores of applicants in the study who had taken the speeded subtests on NORC-style answer sheets were adjusted according to the equatings in Table 5. The means for the NORC-style answer sheet group on NO and CS after adjustment are shown in Table 6. Comparisons of these means with the means of the operational answer sheet group (from Table 4) reveals a dramatic reduction in the differences between the two groups. The difference of about 3.2 raw score points on NO is reduced to .076 raw score point; the difference of about 1.35 on CS is reduced to .019 raw score point.

Table 6. Speeded Subtest Comparisons After NORC Adjustments

	Answer Sheet Group				
	NORC		Operational		
Test	Mean	SD	Mean	SD	F Ratio
Numerical Operations	35.753	8.580	35.829	8.889	0.00
Coding Speed	46.911	12.633	46.930	12.582	24.95

[a]Degrees of freedom are 1 and 8596. Type 1 error rate was set at $p < .01$ per hypothesis. Neither F ratio was significant at this level.

From these results, it is clear that a correction has been found which adjusts for the lower performance on speeded subtests attributable to the NORC-style answer sheets. This suggests that the problem with the 1980 youth population on speeded subtests is correctable by adjusting the NO and CS scores derived from the NORC-style answer sheets used in that study.

1980 Youth Population Adjustments

As further evidence that the equatings successfully corrected for the differential performance observed with the 1980 youth population, two types of analyses were conducted. First, for the 18 through 23 year old males and females in the NORC sample, comparisons were made between the speeded subtest scores prior to and after adjustment based on the integer equatings. Earlier analyses by Sims and Maier (1983) had shown that the speeded subtest scores obtained from the 1980 youth population were low relative to samples of military applicants and recruits when general aptitude level was held constant. Figures 1 and 2 show NORC speeded subtest scores at

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fixed ability levels before and after adjustments for NO and CS, respectively. Aptitude levels were based on the sum of the raw subtest scores found in a composite used by all of the services. The Air Force calls this the General Composite; it contains the WK, AR, and PC subtests.

In Figures 1 and 2, comparisons were made with aptitude fixed at five-point Army standard score intervals (e.g., 80-84, 85-89, 90-94). These graphs reveal that the adjustments to the NORC answer sheets not only correct the low performance at the mean, but consistently increase speeded subtest scores at different levels of aptitude. Therefore, the adjustments are in the appropriate direction both in the study in which they were developed and in the 1980 youth population in which the initial problem was discovered.

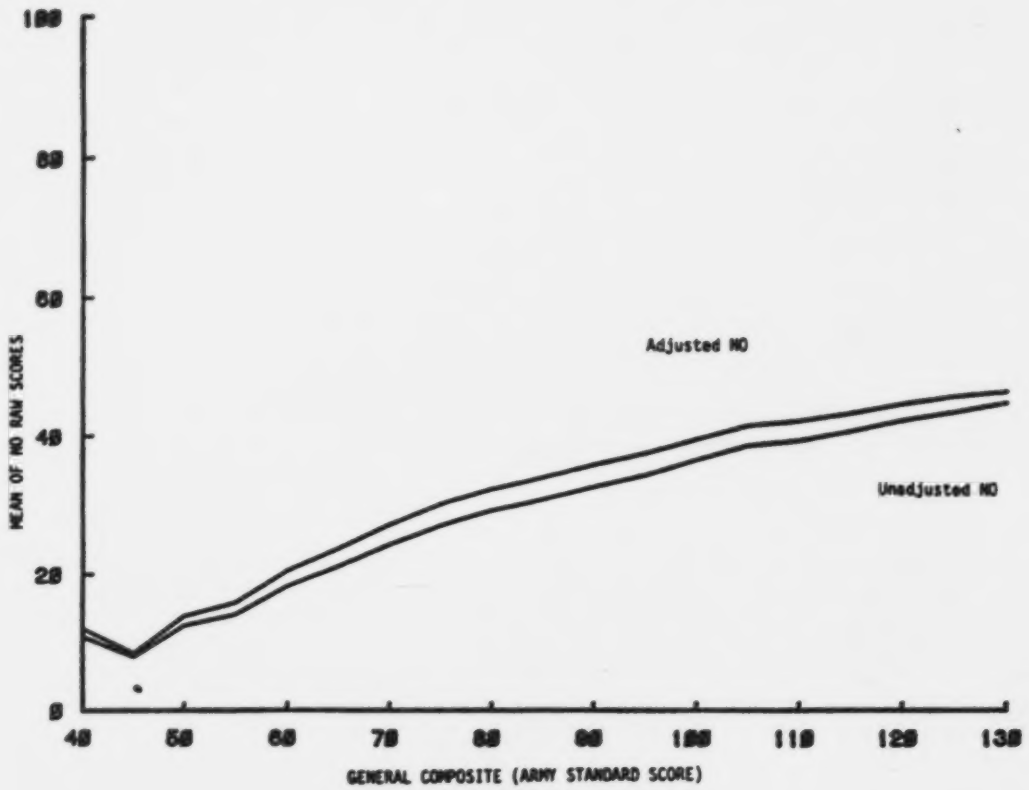

Figure 1. Adjusted and Unadjusted NO Means by General Composite Scores for the 1980 Youth Population.

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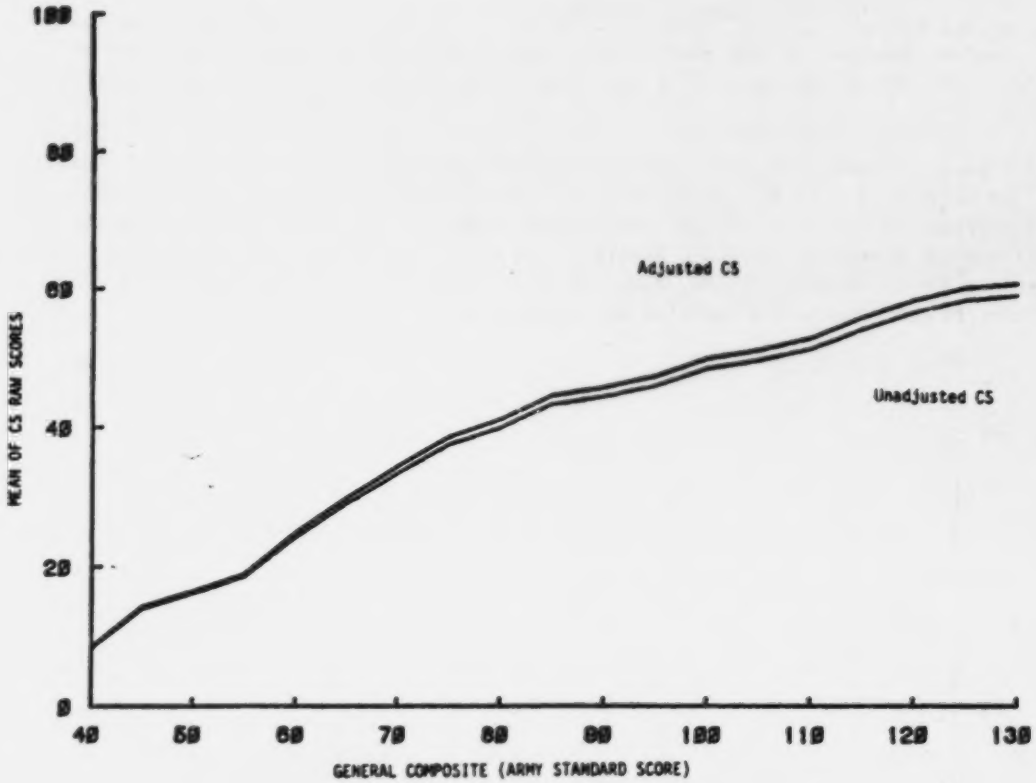

Figure 2. Adjusted and Unadjusted CS Means by General Composite Scores for the 1980 Youth Population.

Also provided for this population is the correlation matrix of raw subtest scores, with NO and CS scores before and after adjustments. Inspection of the matrix of intercorrelations (Table 7) shows little change in the relationship of speeded subtests before and after the corrections (in parentheses). No change should be expected for CS because it was corrected by a linear transformation, and correlation is insensitive to linear transformation. Only a slight difference is observed for NO. Therefore, the adjustments appear to have left the structure of the ASVAB unchanged.

The second type of analysis was based on work by Sims and Maier (1983) involving comparisons between males in the 1980 youth population (NORC) and males tested in military environments. A series of linear models analyses was used to accomplish these comparisons. The 18 through 23 year old males (n = 4,550) in the 1980 youth population (represented in the models by the dichotomous variable NORC) were compared with a sample of male military applicants (n = 2,621) tested in the 1980 Initial Operational Test and Evaluation (IOT&E) of ASVAB Forms 8/9/10

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Table 7. Raw Subtest Score Correlation Matrix for 1980 Youth Population

	GS	AR	WK	PC	NO	NO	CS	CS	AS	MK	MC	EI
GS		.72	.80	.69	.52	(.52)	.45	(.45)	.64	.69	.70	.76
AR			.71	.67	.63	(.63)	.51	(.52)	.53	83	.69	.66
WK				.80	.60	(.62)	.55	(.55)	.53	.67	.60	.68
PC					.60	(.61)	.56	(.56)	.42	.64	.52	.57
NO						(.99)	.70	(.70)	.30	.62	.40	.41
NO							(.70)	(.70)	(.31)	(.62)	(.41)	(.42)
CS								(1.00)	.23	.52	.34	.34
CS									(.23)	(.52)	(.34)	(.34)
AS										.41	.74	.75
MK											.60	.59
MC												.74

[a]Adjusted scores.

(represented by the dichotomous variable IOT&E). For these analyses, NORC and IOT&E were weighted to make the sample sizes equal, with an effective sample size of 5,297. Raw scores on the Air Force General Composite (GEN) were used to control for aptitude level. GEN is a continuous variable. Interaction variables were represented by NORC*GEN and IOT&E*GEN. The predictor sets for the models were:

Model 1: NORC, IOT&E, NORC*GEN, IOT&E*GEN
Model 2: NORC, IOT&E, GEN
Model 3: GEN

These models were used to test differences between groups on NO and CS both before and after adjustments were made for the NORC group. Model 1 allows differences to exist between the NORC and IOT&E samples both on regression slope and regression intercept. Model 2 imposes a common slope and therefore allows only the intercepts to differ. Model 3, the most restricted model, gives information about general ability but does not allow for separate information about group membership.

The results of the linear models analyses are presented in Table 8. The decrease in amount of variance accounted for in Model 2 versus Model 1 was small in all cases (about .005); therefore, the simpler Model 2 was adopted as the full model. Comparison of Model 2 with Model 3 for NO showed that the information provided by knowledge about group membership resulted in a significant increase in R^2 when scores were unadjusted ($F(1,5294) = 177.7$, $p < .01$). After adjustments were made to scores of those tested in the 1980 youth population, no difference existed between the groups when general ability was held constant ($F(1,5294) = 1.2$, n.s.)

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Table 8. Results of Linear Models Analyses of NO and CS Subtests for NORC and IOT&E Samples

Criterion	Model 1 R^2	Model 2 R^2	Model 3 R^2
NO (Unadjusted)	.40954	.40431	.38472
(Adjusted)	.41770	.41226	.41213
CS (Unadjusted)	.33655	.33227	.33093
(Adjusted)	.34290	.33737	.33737

For CS, the difference between Models 2 and 3 for unadjusted scores was smaller, but still statistically significant ($F(1,5294) = 10.8$, $p < .01$). Group membership no longer contributed to R^2 after adjustments were made to the scores of those in the 1980 youth population ($F(1,5294) = 0.0$, n.s.). The adjustments were successful in reducing differences between the 1980 population and military applicants on both speeded subtests.

IV. CONCLUSION

It is concluded that the differences Sims and Maier (1983) observed were primarily due to the use of nonoperational answer sheets in the NORC study. The present study adjusted for differences between the NORC and operational answer sheets to produce conversions for the speeded subtests. These conversions provide corrections to the 1980 youth population that make it appropriate for use as a reference population for the ASVAB. The adequacy of the corrections was demonstrated in the present study as well as in the youth population data in which the problems were initially observed.

The results suggest that with the corrections to the speeded subtests in the NORC data, ASVAB Forms 11/12/13 could be implemented as scheduled in the 1980 score scale.

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APPENDIX A: ADMINISTRATIVE INSTRUCTIONS FOR SPECIAL TEST TYPES A & B
(October 1983)

Special Equating Study
Administrative Instructions

This is one of the MEPS sites that has been selected for a special study that will last approximately one month. We would like to emphasize that this is a crucial study from which many important decisions will be made. The results from this study will serve as a basis for establishing the normative score scale for the ASVAB for the remainder of this Century. It is very important that you follow the instructions exactly as written, and that you double-check to make sure everything is right. A representative of the Joint Services Selection and Classification Working Group (JSSCWG), Headquarters MEPCOM, or your sector will be sent to observe the data collection at some point during the study.

The study involves a special test, which will last approximately twenty minutes, followed by the production ASVAB. The production ASVAB will be administered using standard operational procedures as prescribed in USMEPCOM Regulation 611-1. Therefore, only instructions for the special test are included in this manual. For the special test, two forms of special test booklets (Type A and Type B) will be used. These booklets contain only two subtests--Numerical Operations (NO) and Coding Speed (CS). Two different types of answer forms will be used for testing. One-half of the examinees in each session will use pink operational answer forms (all of those using pink Type A test booklets); the other half of the examinees in each session will use blue special answer forms (all of those using blue Type B test booklets). Testing must be arranged so that Type A and Type B test booklets are used approximately equally in each session. A running total should be kept to verify that overall totals for each type of test booklet are approximately equal. An effort should be made to correct any imbalances consistent with good test administration procedures.

In administering this special test, particular attention should be paid to the timing of the subtests and the equal distribution of the two answer forms in each session. Throughout this study, you will use the special electronic timers provided to you. To ensure the accuracy of the timers, during each administration of a special test, the test administrator will use an accurate timing device (other than the timer) to check the timer. If the provided timer misfunctions or fails to ring, the test administrator will stop the special test after no more than 5 seconds of the correct time (3 minutes for Numerical Operations and 7 minutes for Coding Speed). If the timer does not sound within 2 seconds of the correct time during the administration of a special test, it will be considered inaccurate. Upon identification of inaccurate or malfunctioning timers, use alternate timers and notify your Chief, Test Management Section (CTMS) immediately.

Specific guidance and procedures for the implementation of this study are contained in the OPLAN prepared by MEPCOM. Based on the total number of examinees to be tested (approximately 8,000), selected MEPS have been assigned anticipated samples to test. Beginning 11 Oct 83, all examinees tested at your site will participate in the special testing. You will continue the special testing until informed by your CTMS that the testing has been completed.

Prior to each test session, the test administrator will prepare an adequate number of operational answer forms to be used with the Special Test Type A booklets. To prepare these answer forms, the last page will be carefully removed (so as not to separate the first two pages) and discarded. Using the provided red felt tip pen, the test administrator will, then, draw an X through the remaining parts of the operational answer form that will not be used for the special test (that is, cross out parts 1, 2, 3, 4, and 7). Following the preparation of operational answer forms, an adequate number of Special Test booklets will be prepared. Half the booklets prepared will be Type A; half will be Type B. A pink operational answer form (with the appropriate parts crossed out) will be inserted into each of the pink Type A booklets. A blue special answer form will be inserted into each blue Type B booklet. During the administration of the special tests, the test administrator will visually check to make sure the answer form used by each applicant is appropriate for the booklet being used. Testing materials required for the special testing sessions then include: Special Test Type A Booklets, (with operational answer forms inserted); Special Test Type B Booklets (with special answer forms inserted); special timers; and pencils.

Specific Directions

1. Distribution of Test Booklets and Answer Forms.

To ensure an equal distribution of test booklet types, you have the option of prepositioning the test booklets prior to the arrival of examinees, or handing out the test booklets after your opening comments.

Upon arrival, examinees should be seated in the usual way. Then say:

> We will be administering two sets of tests to you today. The testing will require about three and one-half hours of your time. Both tests are important and necessary for you to apply for the armed services at this time. If you have a question, raise your hand.

Pause and answer questions. Then say:

> If you are not able to test for the full session, for any reason, please indicate this by raising your hand.

Pause and release anyone who wishes to leave. If you did not preposition the test booklets before examinees arrived, hand them out at this time.

Then say:

> You have received a test booklet and an answer form. Please do not open the test booklets until I instruct you to do so. Do NOT separate or tear apart any answer forms.

2. Identification Information and Sample Questions.

Identification data is extremely important for this project. The computer that will scan and score the answer forms does not have the capability to read the data for an individual unless the SSAN grids are properly coded-in on all pages that are utilized. Make sure everyone pays attention and fills in the information at the proper time.
Now say:

> The first thing we're going to do is fill-in the identifying information. Do not mark on your test booklet at any time for any reason. Do not mark on your answer form until I tell you to do so. Since the identifying information is slightly different on the two answer forms, I will give instructions for each group separately. When I am giving instructions for one group, I want the other group to sit quietly. Do not make any marks until I give instructions for your group. I will start with the group with the pink Special Test Type A booklets. Those of you with Test Type B, PLEASE sit quietly while those in the other group fill out their identifying information. For those of you with the pink Special Test Type A booklet, the first thing you need to do is to make sure you have the correct answer form. Your answer form should be 2 pages, printed in pink, and should have "Armed Services Vocational Aptitude Battery" printed at the top. It looks like this.

Hold up a pink operational answer form (DOD 1304.12C). Then say:

> If you have the pink Type A test booklet and you do not have this answer form, please raise your hand.

Make necessary corrections. Then say:

> Now turn your answer form sideways so that you can read the sections for your name, test version, educational level, etc.

Pause, then say:

> On the right side of the answer form, you should see a series of 8 blocks with the heading "Last Name" under it. Raise your hand if you cannot find that area. Above the heading of "Last Name" print your last name or the first eight (8) letters of your name if it is longer. Print the first letter in the first box, the second letter in the second box, and so on. Then blacken the appropriate spaces below the letters you have printed. Be sure you code your name correctly.

Pause, then say:

> Directly below your coded last name there is a series of blocks for your social security number. Raise your hand if you cannot find that area. Above the heading of "Social Security No.," write your social security number (all 9 digits) in the boxes and then blacken the corresponding spaces below the numbers you have written. Do this very carefully. If you do not know your social security number, raise your hand.

Pause, then say:

> Now turn to the second page. Be sure you are on page 2 of the answer form. Find the grid labeled "Social Security No.," write your social security number (all 9 digits) in the boxes and then blacken the corresponding space below the numbers you have written. Do this very carefully. It is very important that you fill in the information correctly on the second page.

Check to see that instructions are properly followed. Allow time for examinees to finish. Now say:

> That is all the information needed for those with Test Type A. Now, those of you with Test Type A PLEASE sit quietly while those with Test Type B fill out their identifying information. For those with Test Type B booklet, the first thing you need to do is to make sure you have the correct answer form. Your answer form should be one sheet folded over, printed in blue, and should be labeled "Special Answer Form B." It looks like this.

Hold up a blue special answer form. Then say:

> If you have the blue Type B test booklet and you do not have this answer form, please raise your hand.

Make necessary corrections. Then say:

> Now, turn your answer form so you can read the marking directions.

Pause, then say:

> At the top of the page, neatly print your last name, first name, and middle initial on the line provided.

Pause, then say:

> Now locate the grid labeled "Social Security Number" directly below where you have been writing. Write your social security number (all 9 digits) in the boxes across the top and then carefully blacken the corresponding space below the numbers you have written, filling the circles completely. Do this very carefully. If you do not know your social security number, please raise your hand.

Pause, check to see that instructions are properly followed, then say:

> Now, look at the box in the upper right-hand corner of your answer form. Read these instructions for marking your answer form silently while I read them aloud.
>
> - USE ONLY THE BLACK LEAD PENCIL GIVEN TO YOU.
> - MAKE HEAVY DARK MARKS THAT COMPLETELY FILL THE CIRCLE.
> - ERASE CLEANLY ANY ANSWER YOU WISH TO CHANGE.
> - MAKE NO STRAY MARKINGS OF ANY KIND.

Pause, then say:

> This completes all the information required for Test Type B.

Pause, then say:

> Does anyone have any questions about either answer form?

Pause, then say:

> We have now completed all of the needed identifying information. Everyone should now turn their answer forms to the front page.

Pause, then say:

> I am now going to read to you the Privacy Act Statement. Please listen carefully.
>
> THESE TESTS WILL BE USED FOR ARMED SERVICES SELECTION SYSTEM'S DEVELOPMENT PURPOSES. USE OF THE SOCIAL SECURITY ACCOUNT NUMBER IS NECESSARY TO MAKE POSITIVE IDENTIFICATION OF THE INDIVIDUAL AND RECORDS. INFORMATION PROVIDED BY RESPONDENTS WILL BE TREATED AS CONFIDENTIAL AND WILL BE USED FOR OFFICIAL PURPOSES ONLY. INDIVIDUAL IDENTITY WILL NOT BE REVEALED. REGARDLESS OF WHETHER RESPONDENTS ARE IDENTIFIED BY NAME AND/OR SOCIAL SECURITY ACCOUNT NUMBER, THE INFORMATION OBTAINED WILL BE USED ONLY TO IMPROVE SELECTION, CLASSIFICATION, ASSIGNMENT, AND EVALUATION TECHNIQUES WITHIN THE ARMED SERVICES' PERSONNEL SYSTEM. DISCLOSURE OF THIS INFORMATION IS MANDATORY. FAILURE TO PROVIDE INFORMATION WOULD HINDER THE ARMED SERVICES' ABILITY TO IMPROVE THE EFFECTIVENESS OF THE PERSONNEL SYSTEM. THE PERSONNEL SYSTEM CONTINUES TO IMPROVE ONLY WITH YOUR ASSISTANCE TO MAKE ADDITIONAL REFINEMENTS IN POLICIES AND PROCEDURES. YOUR COOPERATION IN THIS EFFORT IS APPRECIATED.

Pause, now say:

> Now open your test booklet to page 1 and read the general directions silently while I read them aloud.

Pause, then say:

> DO NOT WRITE YOUR NAME OR MAKE ANY MARKS IN THIS BOOKLET. Mark your answers on the separate answer forms. If you need another pencil while taking this test, hold your pencil above your head. A proctor will bring you another one.

Pause, then say:

> This booklet contains 2 tests. Each test has its own instructions and time limit. When you finish a test you may check your work in that test only. Do not go on to the next test until the examiner tells you to do so. Do not turn back to a previous test at any time.

Pause, then say:

> For each question, be sure to pick the BEST ONE of the possible answers listed. When you have decided which one of the choices given is the best answer to a question, blacken the space on your answer form which has the same number and letter as your choice. Mark only in the answer space. BE CAREFUL NOT TO MAKE ANY STRAY MARKS ON YOUR ANSWER FORM. Each test has a separate section on the answer forms. Be sure you mark your answers for each test in the section that belongs to that test.

Pause, then say:

> Sample Question 1.
>
> S1. A square has
>
> S1-A 2 sides
> S1-B 3 sides
> S1-C 4 sides
> S1-D 5 sides

Pause, then say:

> The correct answer to Sample Question S1 is C. Note how space C opposite number 1 has been blackened. Your marks should look just like this and be placed in the space with the same number and letter as the correct answer to each question. Remember, there is only ONE BEST ANSWER for each question. If you are not sure of the answer, make the BEST GUESS you can. If you want to change your answer, COMPLETELY ERASE your first answer mark.

Pause, then say:

> Answer as many questions as possible. Do not spend too much time on any one question. Work QUICKLY, but work ACCURATELY. DO NOT TURN THIS PAGE UNTIL TOLD TO DO SO.

Pause, then say:

> Are there any questions?

Pause, answer any proper questions.

3. Procedures for Administering Part 5, Numerical Operations.

Now say:

> Turn to page 3 and read the directions for Part 5, Numerical Operations silently, as I read them aloud.

Pause, then say:

> This is a test to see HOW RAPIDLY AND ACCURATELY you can do arithmetic problems. Each problem is followed by four answers, only one of which is correct. Decide which answer is correct, then blacken the space on your answer form which has the same number and letter as your choice.

Pause, then say:

> Now look at the sample problem below.

Pause long enough for examinees to work the sample, then say:

> The answer is 9, so the C answer is correct.

Pause, then say:

> This is a speed test, so work as fast as you can without making mistakes. Do each problem as it comes. If you finish before time is up, go back and check your work.

Pause, then say:

> It is not expected that most people will finish in the amount of time provided. Your score is based on the number of problems answered correctly. It is important that you work rapidly and accurately.

Pause, then say:

> The next thing I am going to tell you is not in your booklet. There are more sections on your answer form than we will use for the special test. The parts we will not use should have already been marked out. Please make sure that you locate the correct section of the answer form before we start each part. If you answer the questions in the wrong section, we will not be able to score your test or use your results. The first test is Part 5. For those of you with Test Type A and the pink answer form, the section for Part 5 is at the bottom of the first page. For those of you with Test Type B and the blue answer form, the section for Part 5 is at the bottom of Page 2, which is on the back of Page 1.

Pause, then say:

> Now find the section of your answer form that is marked "PART 5." When you are told to begin, start with question number 1 in Part 5 of your test booklet and answer space number 1 in Part 5 on your separate answer form. DO NOT TURN THIS PAGE UNTIL TOLD TO DO SO.

Pause, then say:

> There are 50 problems in this test, you will have 3 minutes to work on them. Your score will be based on the number of correct answers. Be sure you mark your answers in Part 5. Are there any questions?

Pause. Answer any proper questions. After you have answered all questions, set your special timer to exactly 3 minutes and be prepared to start the timer. Then say:

> Turn the page and begin. (Start the timer as you say begin.)

After EXACTLY 3 minutes, say:

> STOP! Put your pencils down.

4. Procedures for Administering Part 6, Coding Speed.

Say:

> The next part we will be doing is Part 6, Coding Speed. Find Part 6 on your answer form. For those of you with Test Type A and the pink answer form, Part 6 is the first section on Page 2. For those of you with Test Type B and the blue answer form, Part 6 is the top section on Page 3. Make sure you have located the correct part.

Pause, make sure everyone has found the correct section, then say:

> Now turn directly to page 7, Coding Speed, in your test booklet.

Pause, then say:

> Read the directions for Part 6, Coding Speed, silently as I read them aloud.

Pause, then say:

> This is a test to see how quickly and accurately you can find numbers in a table. At the top of each page there is a number table or "KEY." The key is a group of words with a code number for each word.

Pause, then say:

> Each question in the test is a word taken from the key at the top of that page. From among the possible answers listed for each question, you are to find the one which is the correct code number for that word. Then, blacken the space for that answer on your separate answer form.

Pause, then say:

> Look at the practice key and the five sample questions below.

KEY

green.....2715	man.....3451	salt.....4586
hat.....1413	room....2864	tree.....5972

SAMPLE QUESTIONS		ANSWERS				
		A	B	C	D	E
S1.	room	1413	2715	2864	3451	4586
S2.	green	2715	2864	3451	4586	5972
S3.	tree	1413	2715	3451	4586	5972
S4.	hat	1413	2715	3451	4586	5972
S5.	salt	1413	2864	3451	4586	5972

Pause, then say:

> Notice that each of the questions is one of the words in the key table. To the right of each question are possible answers listed under the letters A, B, C, D, and E. The word in Question S1 is "room." By looking in the key you see that the code number for room is 2864. Among the five possible answers for Question S1, 2864 is listed under choice C, so C is the correct answer. The word for Question number S2 is "green." By looking in the key you see that the code number for green is 2715. Among the possible answers, 2715 is listed under choice A, so A is the correct answer.

Pause, then say:

> Now do Sample Questions S3 through S5 by yourself. First, find the code number for each question by looking it up in the key. Next, find that code number under the answer for that question. DO NOT mark the sample questions on your answer form. Work them in your head. Do this now.

Pause long enough for examinees to work the samples. Test administrators and proctors must ensure that examinees understand the procedures for this test, Then say:

> Work QUICKLY, but work accurately. Most people are not able to finish all the questions. Do as many as you can. Your score is based on the number of problems ANSWERED CORRECTLY.

Pause, then say:

> Now find the section of your answer form that is marked "PART 6." When you are told to begin, start with question number 1 in Part 6 of your test booklet and answer space number 1 in Part 6 on your separate answer form. DO NOT TURN THIS PAGE UNTIL TOLD TO DO SO.

Pause, then say:

> This part has 84 questions in it. You will have 7 minutes to work on them. Your score will be based on the number of correct answers. Are there any questions?

After all proper questions have been answered, set your timer for exactly 7 minutes and be prepared to start the timer. Say:

> Turn the page and begin. (Start the timer as you say begin.)

After exactly 7 minutes, say:

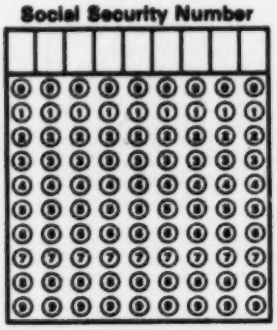
> STOP! Put your pencils down. Close your test booklet. This completes the special study part of the test.

5. When Part 6, Coding Speed, is completed, collect all answer forms used for the special study and all special test booklets. Continue with the standard administration of the production ASVAB. Do not allow any breaks.

APPENDIX B: SAMPLE ANSWER SHEETS

Name _____

Social Security Number



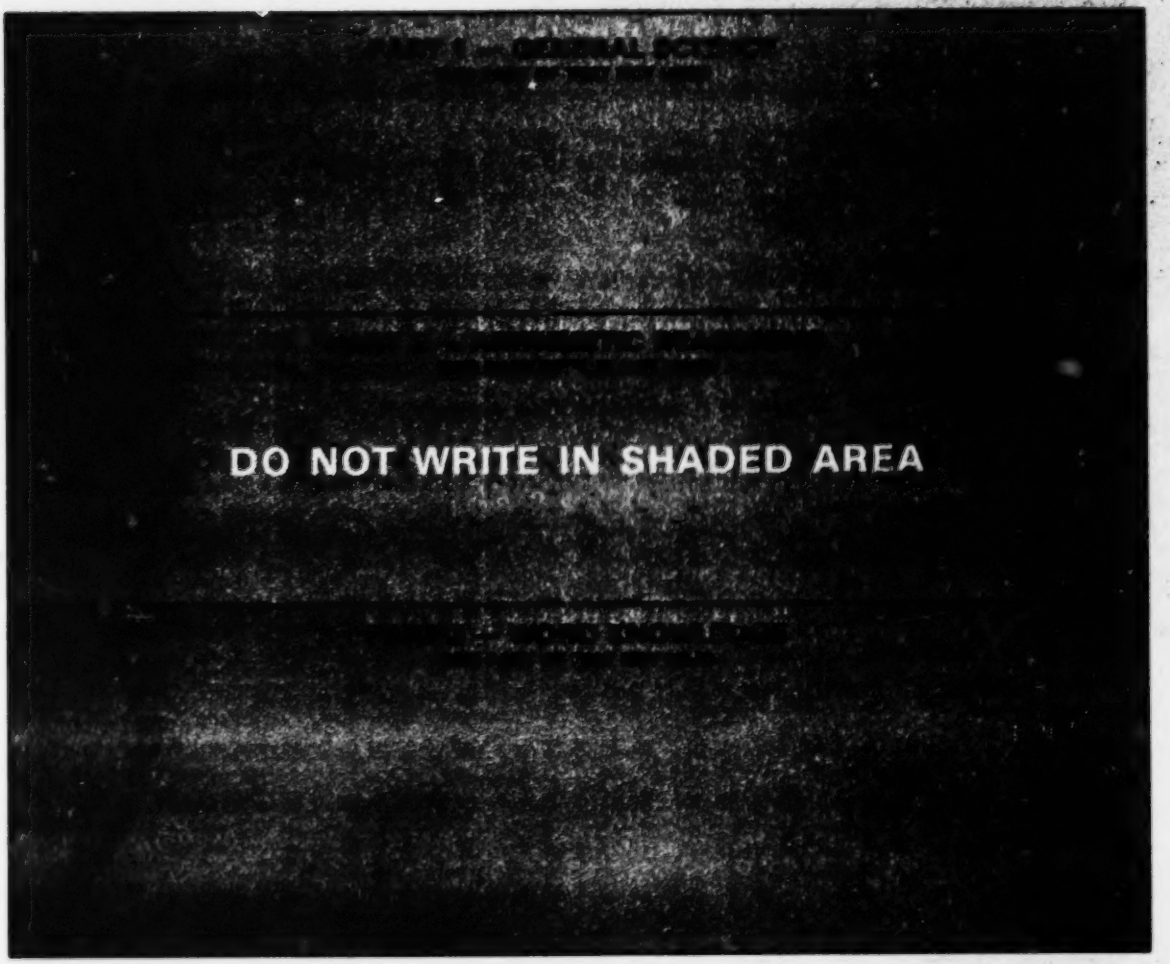
MARKING DIRECTIONS

Your responses will be read by an automatic scanning device. You need only to follow a few simple rules:

- Use only the black lead pencil given to you.
- Make heavy dark marks that completely fill the circle.
- Erase cleanly any answer you wish to change.
- Make no stray markings of any kind.

RIGHT ○ ○ ● ○

WRONG ✓ ✗ ⊘ ◔



SR313/4769-Intron-84381

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DO NOT WRITE

IN THIS SHADED AREA

DO NOT WRITE IN SHADED AREA

PART 5 — NUMERICAL OPERATIONS

1 Ⓐ Ⓑ Ⓒ Ⓓ	11 Ⓐ Ⓑ Ⓒ Ⓓ	21 Ⓐ Ⓑ Ⓒ Ⓓ	31 Ⓐ Ⓑ Ⓒ Ⓓ	41 Ⓐ Ⓑ Ⓒ Ⓓ
2 Ⓐ Ⓑ Ⓒ Ⓓ	12 Ⓐ Ⓑ Ⓒ Ⓓ	22 Ⓐ Ⓑ Ⓒ Ⓓ	32 Ⓐ Ⓑ Ⓒ Ⓓ	42 Ⓐ Ⓑ Ⓒ Ⓓ
3 Ⓐ Ⓑ Ⓒ Ⓓ	13 Ⓐ Ⓑ Ⓒ Ⓓ	23 Ⓐ Ⓑ Ⓒ Ⓓ	33 Ⓐ Ⓑ Ⓒ Ⓓ	43 Ⓐ Ⓑ Ⓒ Ⓓ
4 Ⓐ Ⓑ Ⓒ Ⓓ	14 Ⓐ Ⓑ Ⓒ Ⓓ	24 Ⓐ Ⓑ Ⓒ Ⓓ	34 Ⓐ Ⓑ Ⓒ Ⓓ	44 Ⓐ Ⓑ Ⓒ Ⓓ
5 Ⓐ Ⓑ Ⓒ Ⓓ	15 Ⓐ Ⓑ Ⓒ Ⓓ	25 Ⓐ Ⓑ Ⓒ Ⓓ	35 Ⓐ Ⓑ Ⓒ Ⓓ	45 Ⓐ Ⓑ Ⓒ Ⓓ
6 Ⓐ Ⓑ Ⓒ Ⓓ	16 Ⓐ Ⓑ Ⓒ Ⓓ	26 Ⓐ Ⓑ Ⓒ Ⓓ	36 Ⓐ Ⓑ Ⓒ Ⓓ	46 Ⓐ Ⓑ Ⓒ Ⓓ
7 Ⓐ Ⓑ Ⓒ Ⓓ	17 Ⓐ Ⓑ Ⓒ Ⓓ	27 Ⓐ Ⓑ Ⓒ Ⓓ	37 Ⓐ Ⓑ Ⓒ Ⓓ	47 Ⓐ Ⓑ Ⓒ Ⓓ
8 Ⓐ Ⓑ Ⓒ Ⓓ	18 Ⓐ Ⓑ Ⓒ Ⓓ	28 Ⓐ Ⓑ Ⓒ Ⓓ	38 Ⓐ Ⓑ Ⓒ Ⓓ	48 Ⓐ Ⓑ Ⓒ Ⓓ
9 Ⓐ Ⓑ Ⓒ Ⓓ	19 Ⓐ Ⓑ Ⓒ Ⓓ	29 Ⓐ Ⓑ Ⓒ Ⓓ	39 Ⓐ Ⓑ Ⓒ Ⓓ	49 Ⓐ Ⓑ Ⓒ Ⓓ
10 Ⓐ Ⓑ Ⓒ Ⓓ	20 Ⓐ Ⓑ Ⓒ Ⓓ	30 Ⓐ Ⓑ Ⓒ Ⓓ	40 Ⓐ Ⓑ Ⓒ Ⓓ	50 Ⓐ Ⓑ Ⓒ Ⓓ

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PART 6 — CODING SPEED

1 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	18 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	35 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	52 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	69 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
2 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	19 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	36 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	53 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	70 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
3 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	20 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	37 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	54 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	71 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
4 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	21 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	38 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	55 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	72 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
5 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	22 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	39 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	56 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	73 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
6 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	23 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	40 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	57 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	74 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
7 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	24 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	41 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	58 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	75 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
8 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	25 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	42 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	59 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	76 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
9 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	26 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	43 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	60 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	77 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
10 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	27 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	44 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	61 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	78 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
11 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	28 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	45 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	62 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	79 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
12 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	29 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	46 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	63 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	80 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
13 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	30 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	47 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	64 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	81 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
14 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	31 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	48 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	65 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	82 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
15 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	32 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	49 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	66 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	83 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
16 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	33 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	50 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	67 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	84 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
17 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	34 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	51 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	68 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	

DO NOT WRITE IN SHADED AREA

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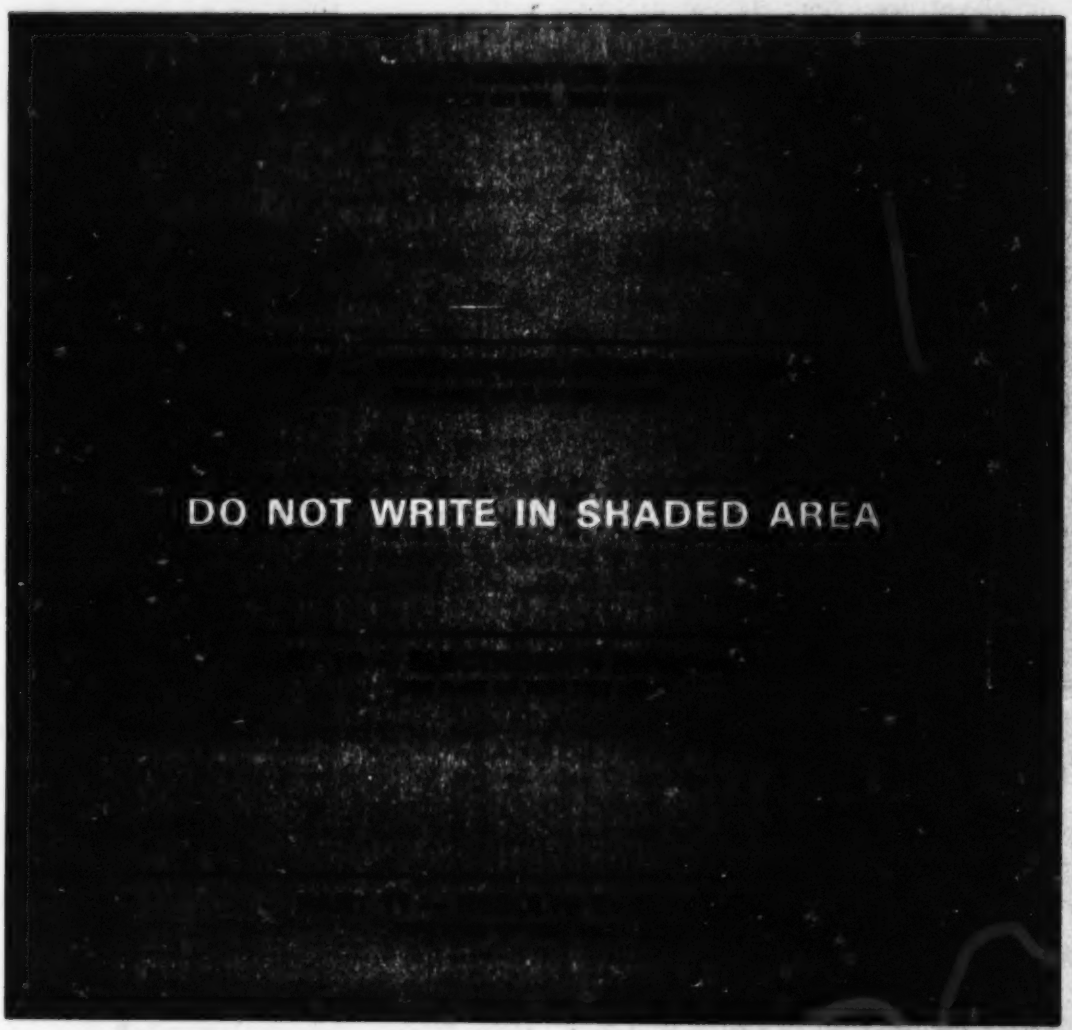

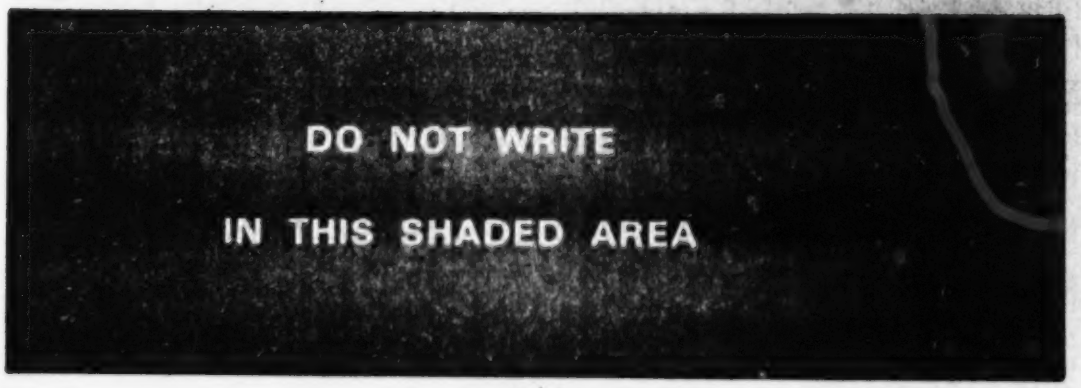

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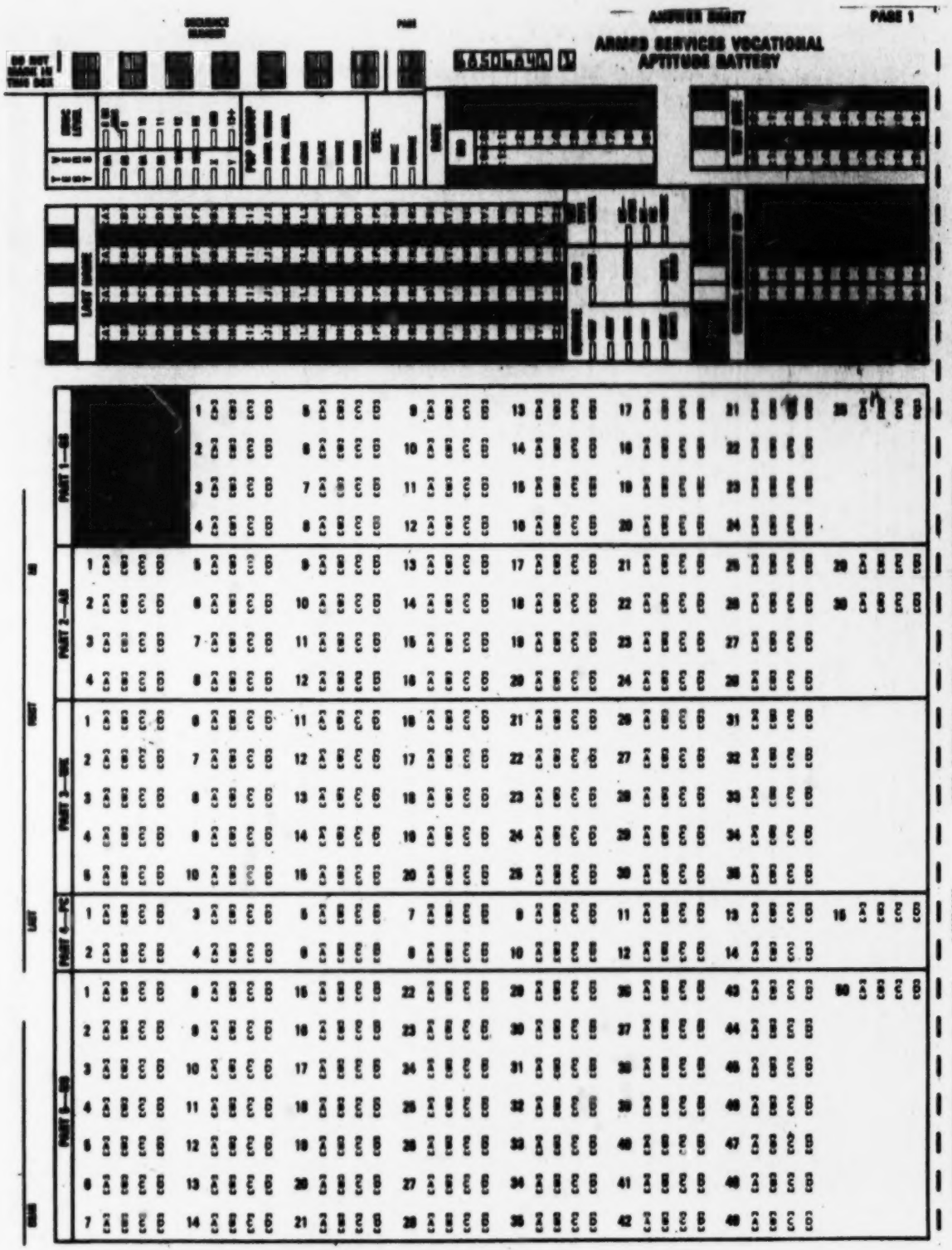

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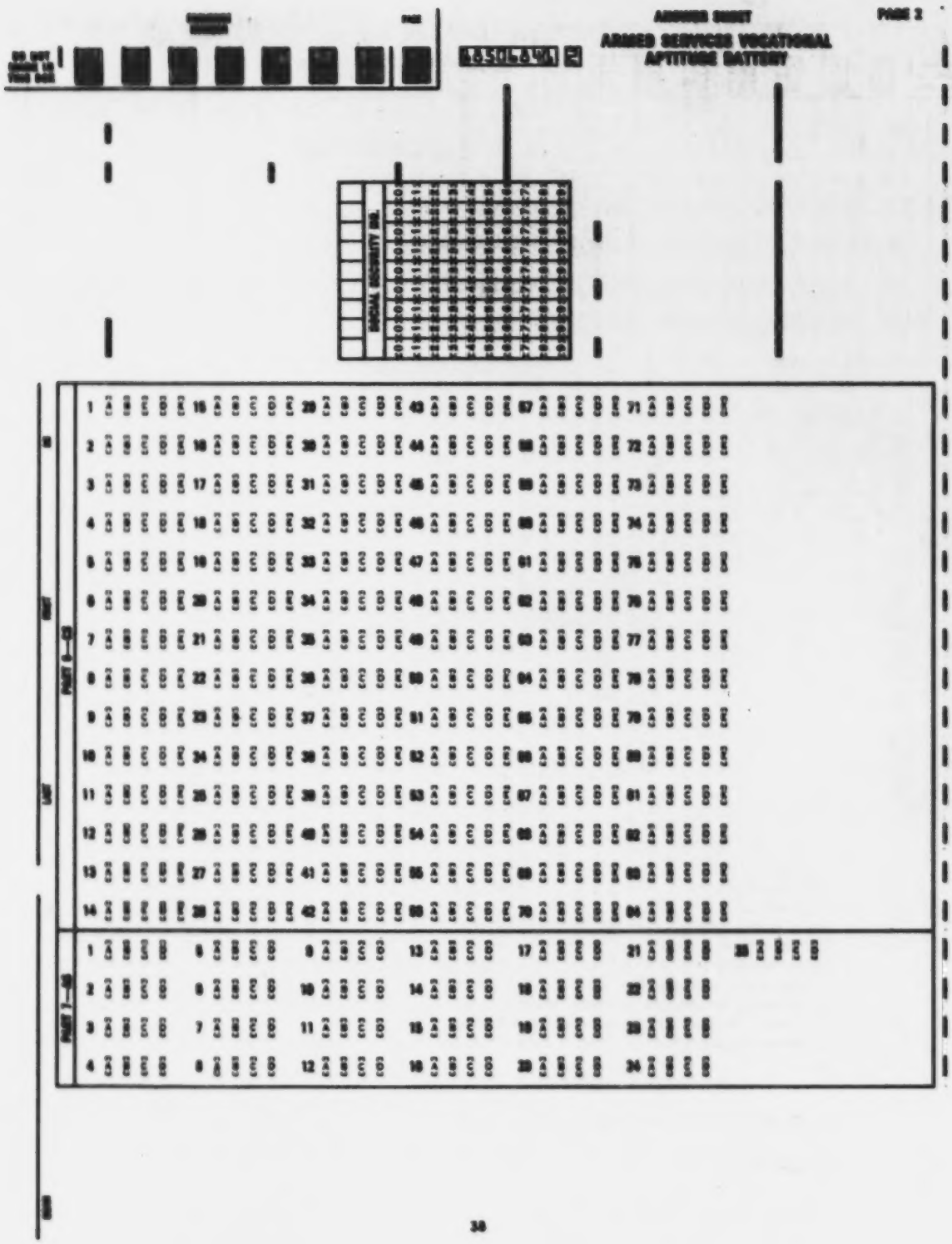

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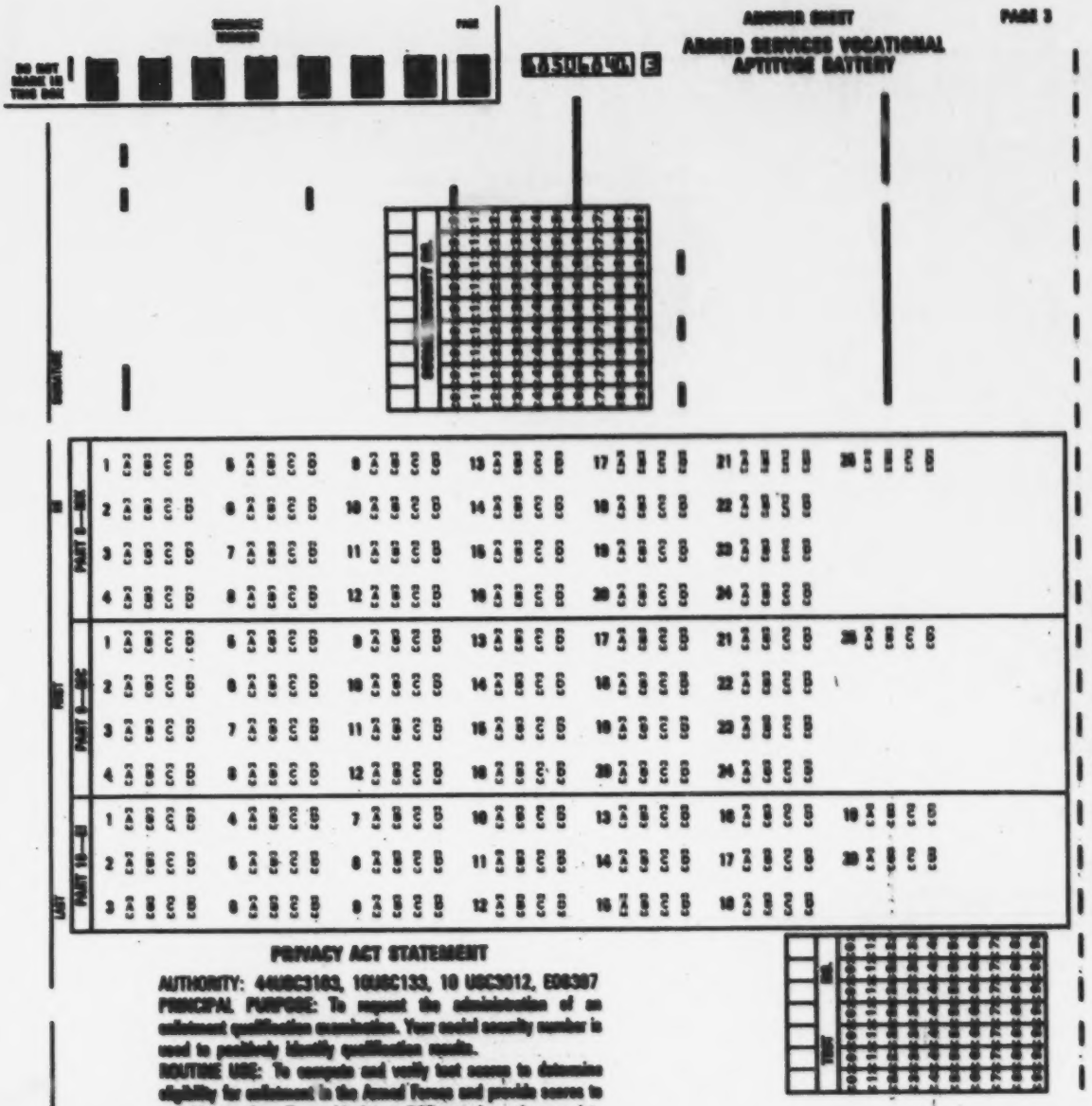
ANSWER SHEET
PAGE 3
ARMED SERVICES VOCATIONAL APTITUDE BATTERY
PART 8—WK
PART 9—MC
PART 10—AI
FOR OFFICIAL USE ONLY (WHEN COMPLETED)
PRIVACY ACT STATEMENT
AUTHORITY: 44USC3103, 10USC133, 10 USC3012, EO9397
PRINCIPAL PURPOSE: To request the administration of an enlistment qualification examination. Your social security number is used to positively identify qualification results.
ROUTINE USE: To compute and verify test scores to determine eligibility for enlistment in the Armed Forces and provide scores to recruiting services. To provide data to DOD agencies and appropriate outside activities for compilation or research purposes.
DISCLOSURE: Disclosure is mandatory. If you fail to answer any or all of these personal questions, you will not be allowed to take the test.
I certify that I am physically and mentally fit to take this test today.
SIGNATURE
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